(19)日本国特許庁（ＪＰ）　(12)公開特許公報（Ａ）　(11)特許出願公開番号

特開平11－133420

(43)公開日　平成11年(1999)5月21日

(51)Int.Cl.⁶		識別記号	PI		
Ｇ０２Ｆ	1/1335	５３０	Ｇ０２Ｆ	1/1335	５３０
		５１０			５１０
// Ｇ０２Ｂ	5/00		Ｇ０２Ｂ	5/00	Ｂ

審査請求　未請求　請求項の数１　ＯＬ　（全６頁）

(21)出願番号　特願平9－294302

(22)出願日　平成９年(1997)10月27日

(71)出願人　000005108
株式会社日立製作所
東京都千代田区神田駿河台四丁目６番地

(72)発明者　平方　純一
千葉県茂原市早野3300番地　株式会社日立製作所電子デバイス事業部内

(74)代理人　弁理士　武　顕次郎

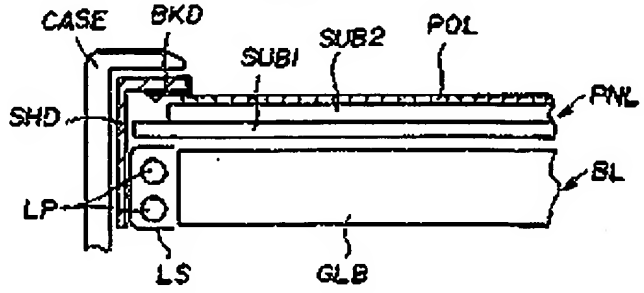
(54)【発明の名称】　液晶表示装置

(57)【要約】

【課題】狭額縁化したときの表示域と上フレームの間に漏れる光を遮蔽して高コントラストと良好な視認性を確保する。

【解決手段】対向配置された少なくとも一方に画素選択用の電極を有する一対の透明基板ＳＵＢ１，ＳＵＢ２の間に液晶層を狭持してなる液晶パネルＰＮＬと，液晶パネルを挟んで配置された上偏光板ＰＯＬおよび下偏光板と，前記電極に表示信号に応じた電圧を印加するための駆動手段と，液晶パネルの背面に設置されたバックライトＢＬとを表示窓を有する上フレームと上フレームと連接する下フレームにより固定してなり，上フレームＳＨＤの表示窓の少なくとも液晶パネルＰＮＬの端部分に

図１



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【特許請求の範囲】

【請求項１】対向配置された少なくとも一方に画素選択用の電極を有する一対の透明基板の間に液晶層を挟持してなる液晶パネルと、前記液晶パネルを挟んで配置された上偏光板および下偏光板と、前記電極に表示信号に応じた電圧を印加するための駆動手段と、前記液晶パネルの背面に設置されたバックライトとを表示窓を有する上フレームおよびこの上フレームと連接する下フレームにより固定してなる液晶表示装置において、

前記上フレームの表示窓の少なくとも前記液晶パネルを臨む部分に吸光処理面を有すると共に、前記上偏光板を前記上フレームの下層まで延在させて配置したことを特徴とする液晶表示装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、液晶表示装置に係り、特にコントラストが高く、視認性に優れた液晶表示装置に関する。

【０００２】

【従来の技術】ノート型コンピュータやコンピュータモニター用の高精細かつカラー表示が可能な液晶表示装置では、液晶パネルを背面から照明する光源（所謂、バックライト）を備えている。バックライトには、導光板と称するアクリル樹脂等で成形した透明板の側面に線状のランプを配置したサイドエッジ方式と、液晶パネルの背面直下にランプを配置した直下型方式とが知られている。

【０００３】特に、薄型化が要求されるノート型コンピュータでは、サイドエッジ方式が採用されており、またモニター用液晶表示装置でも奥行きを短縮するためにはサイドエッジ方式が用いられる。

【０００４】この種の液晶表示装置は、基本的には少なくとも一方が透明なガラス等からなる二枚の基板の間に液晶層を挟持した所謂液晶パネルを構成し、上記液晶パネルの基板に形成した画素形成用の各種電極に選択的に電圧を印加して所定画素の点灯と消灯を行う形式、上記各種電極と画素選択用のアクティブ素子を形成してこのアクティブ素子を選択することにより所定画素の点灯と消灯を行う形式とに分類される。

【０００５】後者の形式の液晶表示装置はアクティブマトリクス型と称し、コントラスト性能、高速表示性能等から液晶表示装置の主流となっている。従来のアクティブマトリクス型液晶表示装置は、一方の基板に形成した

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に櫛歯電極を用いて非常に広い視野角を得るようにしたものが知られている（特公昭６３－２１９０７号公報、米国特許第４３４５２４９号明細書）。

【０００７】

【発明が解決しようとする課題】ノート型コンピュータに限らず、各種情報処理装置のコンピュータモニター用の液晶表示装置は年々サイズが大型化しており、かつ狭額縁化の要求が強くなってきている。液晶表示装置が狭額縁化された場合、装置端縁と表示域の間隔が狭くなるため、バックライトから表示域への光漏れを十分に遮光することが困難である。

【０００８】図６は従来の液晶表示装置の要部構造例を説明する概略断面図であって、二枚の基板ＳＵＢ１（下基板）とＳＵＢ２（上基板）の間に液晶を挟持し、その上下面に偏光板ＰＯＬ（図では上偏光板のみを示した）を積層した液晶パネルＰＮＬと、この液晶パネルの背面に設置したバックライトＢＬとを上フレームＳＨＤと下フレーム（図示せず）で固定して液晶モジュールを構成する。

【０００９】この液晶モジュールは、実装するノートパソコンやコンピュータモニター等のケースＣＡＳＥに収納して当該コンピュータモニター等の表示装置とする。

【００１０】しかし、この種の液晶表示装置では、その上フレームは電磁輻射を抑制するためのと機械的強度を確保するために金属板で形成されるものであるため、その表面での光反射率が高く、表示域の外縁でのバックライトからの漏れ光が上フレームの表示窓の内周領域で反射して表示域の周囲が明るくなる明縁現象が起こる。図７は従来の液晶表示装置における光漏れの発生を説明する図６のＡ部分の拡大図である。

【００１１】液晶パネルＰＮＬは、上基板ＳＵＢ１と下ＳＵＢ２とからなり、上基板の上面には上偏光板ＰＯＬが貼付されている。この上偏光板ＰＯＬは上基板ＳＵＢ２の端縁から内方に引っ込んだ位置にある。また、狭額縁化のために上フレームＳＨＤの幅が狭くされている。

【００１２】そして、液晶パネルＰＮＬの周縁からの光漏れを防止するためのバックライトＢＬと液晶パネルＰＮＬの間の周縁に遮光スペーサｉＬＳを挟み込んでいる。

【００１３】しかし、同図中に矢印で示したように、偏光板ＰＯＬの縁から出射したバックライトからの光の一部は上フレームＳＨＤの側縁で反射し、あるいは液晶パネルと上フレームＳＨＤの内側の間で反射して表示面方

【００１６】

【課題を解決するための手段】上記目的を達成するため．本発明は．対向配置された少なくとも一方に画素選択用の電極を有する一対の透明基板の間に液晶層を挟持してなる液晶パネルと、前記液晶パネルを挟んで配置された上偏光板および下偏光板と、前記電極に表示信号に応じた電圧を印加するための駆動手段と、前記液晶パネルの背面に設置されたバックライトとを表示窓を有する上フレームおよびこの上フレームと追接する下フレームにより固定してなる液晶表示装置において、前記上フレームの表示窓の少なくとも前記液晶パネルを臨む部分に吸光処理面を有すると共に．前記上偏光板を前記上フレームの下面まで延在させて配置した点に特徴を有する。

【００１７】上記構成により、バックライトの出射光が表示域と上フレームの間から漏れたり．金属フレームに反射して表示方向に漏れ出るのが防止され、また上偏光板の端縁を上フレームの下面まで延ばして設置することで遮光効果がさらに向上する。

【００１８】上記の上フレームの表示窓の少なくとも前記液晶パネルを臨む部分に施す吸光処理は、クロム等の黒色金属被膜．ステンレスや鉄あるいはアルミニウム等の光沢の在る金属表面を黒色塗料を塗布または焼付けて得られる。また．上フレーム自体の材料をクロム．その他の黒色金属板で形成してもよい。

【００１９】さらに、黒色の樹脂で遮光フレームを形成し．これを上フレームの窓部の内側に埋め込んだり、黒色のプラスチックテープ等を貼り付けてもよい。

【００２０】このとき、上フレームの液晶パネルを臨む表面の反射率を５％以下とすれば漏れ光によるコントラストの低下や視認性の劣化は防止できることが実験的に確認された。

【００２１】なお、本発明は、液晶層に印加する電圧の変化でバックライトからの照明光の透過／不透過を制御して白表示から黒表示、あるいは黒表示から白表示へと変化する。本発明は、ねじれ角が９０度前後のツイステッドネマチック（ＴＮ型）液晶、ねじれ角が２００から２６０度のスーパーツイステッドネマチック（ＳＴＮ型）液晶を用いた液晶表示装置、あるいは垂直配向タイプ（縦電界方式）のＴＦＴや基板面に平行な方向の電界で動作する横電界方式の液晶表示装置．その他の型式の液晶表示装置にも適用できる。

【００２２】

【発明の実施の形態】以下　本発明の実施の形態につ

【００２４】この液晶表示装置がＴＮ型と垂直配向タイプの縦電界方式の場合、液晶層２の屈折率異方性Δｎとセルギャップ（上下基板間の間隙）ｄとの積Δｎ・ｄは０．２から０．６μｍの範囲がコントラスト比と明るさを両立させるためには好ましく、ＳＴＮ型の場合は０．５から１．２μｍの範囲が．横電界方式では０．２から０．５μｍの範囲が好ましい。

【００２５】ここでは、上下基板３ｂ．３ａとしては、厚みが０．７ｍｍで表面を研磨し、ＩＴＯ（インジウムチンオキサイド）の透明電極をスパッタ法で成膜したガラス基板を２枚用いる。これらの上下基板３ｂ．３ａの間に誘電率異方性Δεが正で、その値が４．５であり．複屈折率Δｎが０．１９（５８９ｎｍ、２０°Ｃ）のネマチック液晶組成物を挟み、セルギャップは６μｍとしたため、Δｎ・ｄは１．４１μｍとした。

【００２６】そして、基板表面に塗布したポリイミド系配向制御膜をスピンナーで塗布し、２５０°Ｃで３０分間焼成し、ラビング処理を行って３．５度のプレチルト角を形成した。なお、このプレチルト角は回転結晶法で測定した。上下基板のラビング方向は時分割駆動を行うため液晶分子のねじれ角（ツイスト角）が２４０度となるように設定した。ここで．ツイスト角はラビング方向およびネマチック液晶に添加される旋光性物質の種類と量によって規定される。

【００２７】ねじれ角は閾値近傍の点灯状態が光を散乱する配向となることから最大値が制限され、２６０度が上限であり、また下限はコントラストによって制限され．２００度が限界である。

【００２８】本実施例では．走査線数が２００本以上でも十分なコントラストで白黒表示が可能な液晶表示装置を得ることを目的としたので、ねじれ角は２４０度とした。また、下基板３ａと上基板３ｂと各偏光板１ａと１ｂの間に、ポリカーボネートからなるΔｎ・ｄ＝０．４μｍの位相差フィルムを各一枚配置した（図示せず）。

【００２９】本実施例では．液晶パネルＰＮＬを固定する上フレームＳＨＤの液晶パネルを臨む部分、すなわち．当該上フレームＳＨＤの窓部内側と内側縁に吸光処理面ＢＫＤを備えた。これと共に、液晶パネルＰＮＬの上基板ＳＵＢ２に貼付する上偏光板ＰＯＬを上フレームＳＨＤの下側まで延ばした。

【００３０】図２は本発明による液晶表示装置の第１実施例の上フレームの構成を説明する部分図である。

【００３１】同図（ａ）は上フレームＳＨＤの裏面を示

にも同様の吸光処理面ＢＫＤを形成してもよく．さらに当該上フレームＳＨＤの残りの部分の一部または全体に同様の吸光処理面ＢＫＤを形成してもよい。

【００３３】この実施例の構成としたことにより．狭額縁化した場合の液晶パネルの表示域と上フレームの間からの光漏れが抑制され、コントラストが高く、視認性に優れた液晶表示装置を得ることができる。

【００３４】図３は本発明による液晶表示装置の組立完成図であり、（Ａ）は表示面側の平面図、（Ｂ）は左側面図．（Ｃ）は右側側面図．（Ｄ）は上側側面．（Ｅ）は下側側面図を示す。

【００３５】同図において．ＳＨＤは上フレーム．ＡＲは表示域、ＭＣＡは下フレーム（下側ケース）．ＨＬＤ１～４は取り付け穴、ＬＣＴは接続コネクタ、ＬＰＣ１．２はランプケーブル．ＣＴ１はインターフェースコネクタ、ＷＤは表示領域を露出する開口である。また、ＰＯＬは上偏光板で液晶パネルＰＮＬの上面を覆って貼付されている。

【００３６】この液晶表示装置は、上フレームＳＨＤと下フレームＭＬの２種類の収納・保持部材を用いて組み込まれ、取り付け穴ＨＬＤ１～４でノートパソコンやモニター等の情報処理装置の表示部に実装される。

【００３７】取り付け穴ＨＬＤ１とＨＬＤ３の間にある凹部にはバックライト用のインバータが組み込まれ、接続コネクタＬＣＴとランプケーブルＬＰＣ１，ＬＰＣ２でバックライト組立体を構成する冷陰極蛍光灯（光源ランプ）に電力を供給する。なお、この例では蛍光管は液晶表示素子ＰＮＬの裏上下辺に組み込まれる。

【００３８】本体コンピュータ（ホスト）からの信号および必要な電源は裏面に位置するインターフェースコネクタＣＴ１を介して供給される。

【００３９】図示の液晶表示装置は外径寸法が大きく、表示域ＡＲも大きくなったにも係わらず、表示に寄与しない所謂額縁領域が小さい。さらに．重量も軽量化され．可搬型情報処理装置の可搬性を失うことなく見やすい大画面表示が得られる。

【００４０】図４は本発明による液晶表示装置の全体構成を説明する展開斜視図である。同図は液晶表示パネル．回路基板．バックライト、その他の構成部材を一体化した液晶表示装置（モジュール：ＭＤＬと称する）の具体的構造を説明するものである。

【００４１】ＳＨＤは金属板からなる上フレーム（シールドケース．メタルフレームとも言う）．ＷＤは表示

ＩＬＳは遮光スペーサ、ＰＲＳはプリズムシート．ＳＰＳは拡散シート．ＧＬＢは導光板、ＲＦＳは反射シート．ＭＣＡは一体化成形により形成された下フレーム（下側ケース：モールドフレーム）．ＭＯはＭＣＡの開口．ＢＡＴは両面粘着テープであり．図示の配置関係で拡散板部材を積み重ねて液晶表示モジュールＭＤＬが組立てられる。なお、光源ランプ部分の図示は省略した。

【００４２】この液晶表示装置は（液晶表示モジュールＭＤＬ）は、下フレームＣＡと上フレームＳＨＤの２種の収納・保持部材を有し．絶縁シートＩＮＳ１～３、回路基板ＰＣＢ１～３、液晶表示パネルＰＮＬを収納固定し．導光板ＧＬＢ等から構成されるバックライトを収納した下フレームＭＣＡを上フレームＳＨＤに合体させてなる。

【００４３】映像信号線駆動用回路基板ＰＣＢ１には液晶表示パネルＰＮＬの各画素を駆動するための集積回路チップが搭載され、またインターフェース回路基板ＰＣＢ３には外部ホストからの映像信号の受入れ、タイミング信号等の制御信号を受け入れる集積回路チップ．およびタイミングを加工してクロック信号を生成するタイミングコンバータ（ＴＣＯＮ）等が搭載される。

【００４４】上記タイミングコンバータで生成されたクロック信号は映像信号線駆動用回路基板ＰＣＢ１に搭載された集積回路チップに供給される。

【００４５】インターフェース回路基板ＰＣＢ３および映像信号線駆動用回路基板ＰＣＢ１は多層配線基板であり．上記クロック信号ラインＣＬＬはインターフェース回路基板ＰＣＢ３および映像信号線駆動用回路基板ＰＣＢ１の内層配線として形成される。

【００４６】なお、液晶表示パネルＰＮＬにはＴＦＴを駆動するためのドレイン側回路基板ＰＣＢ１、ゲート側回路基板ＰＣＢ２およびインターフェース回路基板ＰＣＢ３がテープキャリアパッケージＴＣＰ１，ＴＣＰ２で接続され、各回路基板間はジョイナＪＮ１，２．３で接続されている。

【００４７】図５は図４に示した液晶表示装置を実装した情報処理装置の一例を説明するパソコンの外観図であって．前記各図と同一符号は同一部分に対応し．ＩＶは蛍光管駆動用のインバータ電源、ＣＰＵはホスト側中央演算装置である。

【００４８】同図に示したパソコンによれば、その視野角が広く、均一なコントラストで視認性の良好な画像表示が得られる．

狭額縁化した場合の液晶パネルの表示域と上フレームの間からの光漏れが抑制され、コントラストが高く、視認性に優れた液晶表示装置を得ることができる。

【図面の簡単な説明】

【図１】本発明による液晶表示装置の第１実施例を説明する要部断面模式図である。

【図２】本発明による液晶表示装置の第１実施例の上フレームの構成を説明する部分図である。

【図３】本発明による液晶表示装置の組立完成図である。

【図４】本発明による液晶表示装置の全体構成を説明する展開斜視図である。

【図５】図４に示した液晶表示装置を実装した情報処理装置の一例を説明するパソコンの外観図である。

【図６】従来の液晶表示装置の要部構造例を説明する概＊略断面図である。

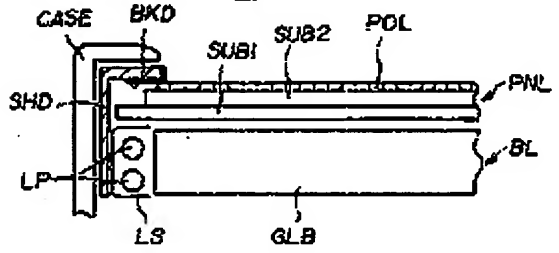
【図７】従来の液晶表示装置における光漏れの発生を説明する図６のＡ部分の拡大図である。

【符号の説明】

ＳＵＢ１　下基板
ＳＵＢ２　上基板
ＰＯＬ　上偏光板
ＧＬＢ　導光板
ＬＰ　光源ランプ
ＬＳ　反射器
ＳＨＤ　上フレーム
ＢＫＤ　吸光処理面
ＣＡＳＥ　実装するコンピュータ等の表示部を構成するケース。

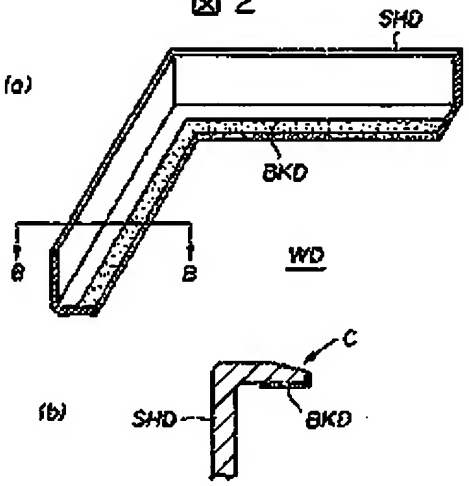
【図１】

図１



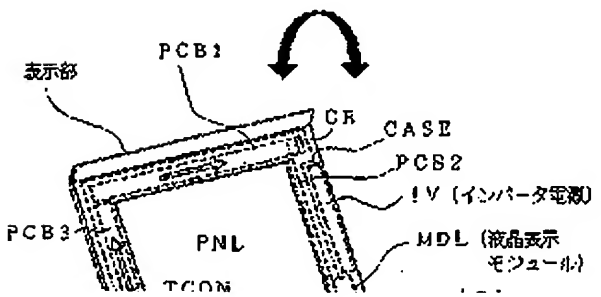
【図２】

図２



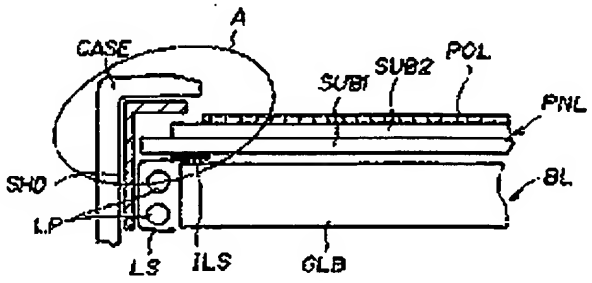
【図５】

図５

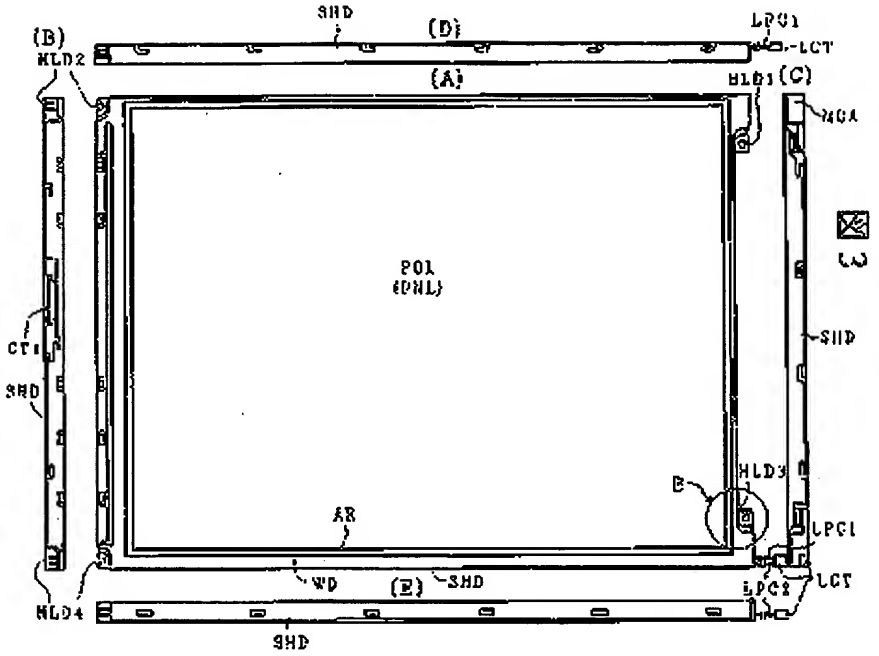


【図６】

図６



【図３】


SHD
(D)
LPC1
LCT
(B)
HLD2
(A)
HLD1
(C)
MCA
POL
(PNL)
CT1
SHD
HLD3
B
AR
LPC1
WD
(E)
SHD
LPC2
LCT
HLD4
SHD

【図４】

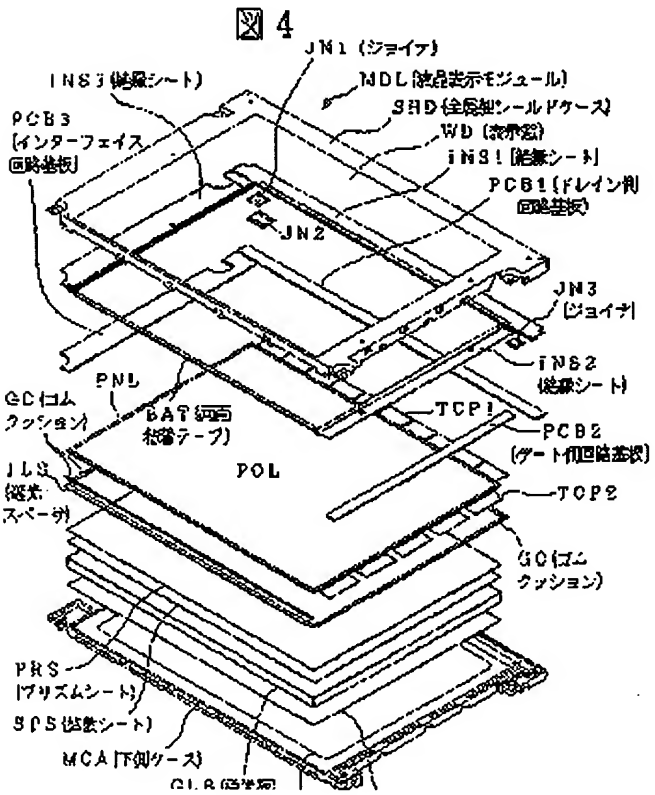


図４
JN1 (ジョイナ)
INS3 (絶縁シート)
MDL (液晶表示モジュール)
SHD (金属製シールドケース)
PCB3
(インターフェイス
回路基板)
WD (表示窓)
INS1 (絶縁シート)
PCB1 (ドレイン側
回路基板)
JN2
JN3
(ジョイナ)
INS2
(絶縁シート)
PNL
GC (ゴム
クッション)
BAT (両面
粘着テープ)
TCP1
PCB2
(ゲート側回路基板)
POL
ILS
(導光
スペーサ)
TCP2
GC (ゴム
クッション)
PRS
(プリズムシート)
SPS (拡散シート)
MCA (下側ケース)

【図７】

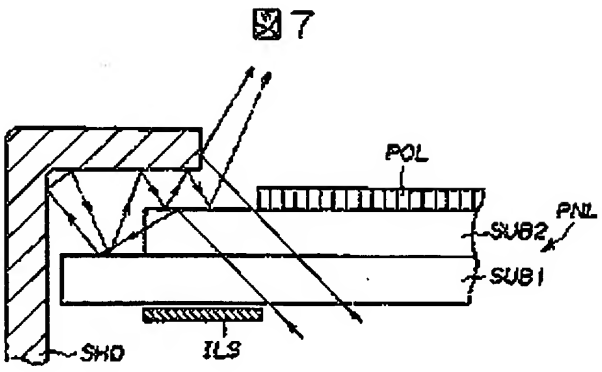


図７
POL
PNL
SUB2
SUB1
SHD
ILS

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CLAIMS

[Claim(s)]
[Claim 1] The liquid crystal panel which comes to pinch a liquid crystal layer between the transparence substrates of the pair which has an electrode for pixel selection at least in one side by which opposite arrangement was carried out, The upper polarizing plate arranged on both sides of said liquid crystal panel and a bottom polarizing plate, and the driving means for impressing the electrical potential difference according to a status signal to said electrode, In the liquid crystal display which it comes to fix by the bottom frame the installed back light is connected [bottom / tooth back / of said liquid crystal panel] with the upper frame which has a display window, and this upper frame The liquid crystal display characterized by having made said upper polarizing plate extend to the lower layer of said upper frame, and having arranged it while having the extinction processing side into the part of the display window of said upper frame which faces said liquid crystal panel at least.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to a liquid crystal display, especially contrast is high and is related with the liquid crystal display excellent in visibility.
[0002]
[Description of the Prior Art] In the liquid crystal display in which the high definition and color display for a notebook computer or computer screens are possible, it has the light source (the so-called back light) which illuminates a liquid crystal panel from a tooth back. The side edge method which has arranged the linear lamp on the side face of the transparence plate fabricated with the acrylic resin called a light guide plate in the back light, and the direct female mold method which has arranged the lamp directly under [tooth-back] a liquid crystal panel are learned.
[0003] Especially in the notebook computer as which thin shape-ization is required, in order to adopt the side edge method and to shorten depth also with the liquid crystal display for monitors, a side edge method is used.
[0004] This kind of liquid crystal display constitutes fundamentally the so-called liquid crystal panel with which at least one side pinched the liquid crystal layer between two substrates which consist of transparent glass etc. It is classified into the format of impressing an electrical potential difference to the various electrodes for pixel formation formed in the substrate of the above-mentioned liquid crystal panel alternatively, and performing lighting and putting out lights of a predetermined pixel, and the format of performing lighting and putting out lights of a predetermined pixel by forming the active component the various above-mentioned electrodes and for pixel selection, and choosing this active component.
[0005] The liquid crystal display of the latter format is called a active-matrix mold, and its liquid crystal display is in use from the contrast engine performance, the high-speed display engine performance, etc. The so-called vertical electric-field method which impresses the electric field for changing the direction of orientation of a liquid crystal layer between the electrode formed in one substrate and the electrode formed in the substrate of another side was used for the conventional active matrix liquid crystal display.
[0006] Moreover, the so-called liquid crystal display of the horizontal electric-field method (it is also called an IPS method) which makes the direction of the electric field impressed to a liquid crystal layer a direction almost parallel to a substrate side was realized in recent years. What uses a ctenidium electrode for one side of two substrates, and obtained the very large angle of visibility as a liquid crystal display of this horizontal electric-field method is known (JP,63-21907,B, U.S. Pat. No. 4345249 specification).
[0007]
[Problem(s) to be Solved by the Invention] Size has enlarged the liquid crystal display for the computer screens of not only a notebook computer but various information processors every year, and the demand of narrow-picture-frame-izing is becoming strong. Since spacing of the equipment edge and viewport becomes narrow when a liquid crystal display is narrow-picture-frame-ized, it is difficult to fully shade the optical leakage by viewport from a back light.
[0008] Drawing 6 is an outline sectional view explaining the example of important section structure of the conventional liquid crystal display. The liquid crystal panel PNL which pinched liquid crystal between two substrates SUB1 (bottom substrate) and SUB2 (upper substrate), and carried out the laminating of the polarizing plate POL (only the upper polarizing plate was shown by a diagram) to the vertical side, The back light BL installed in the tooth back of this liquid crystal panel is fixed with the upper frame SHD and a bottom frame (not shown), and a liquid crystal module is constituted.
[0009] This liquid crystal module is contained in the case CASE of the notebook computer to mount, a computer screen, etc., and let it be displays, such as the computer screen concerned.
[0010] however -- this kind of liquid crystal display -- that upper frame -- electromagnetism -- since it is what is formed

with a metal plate in order to secure that for controlling radiation, and a mechanical strength, the rate of a light reflex in that front face is high, and the **** phenomenon in which the leakage light from the back light in the rim of viewport reflects in the inner circumference field of the display window of an upper frame, and the perimeter of viewport becomes bright happens. Drawing 7 R> 7 is the enlarged drawing of A part of drawing 6 explaining generating of the optical leakage in the conventional liquid crystal display.

[0011] A liquid crystal panel PNL serves as the upper substrate SUB 1 from under [2] SUB, and the upper polarizing plate POL is stuck on the top face of an upper substrate. Besides, a polarizing plate POL is in the location which withdrew into the method of inside from the edge of the upper substrate SUB 2. Moreover, width of face of the upper frame SHD is narrowed for narrow-picture-frame-izing.

[0012] And the protection-from-light spacer ILS is put between the periphery between the back lights BL and liquid crystal panels PNL for preventing the optical leakage from the periphery of a liquid crystal panel PNL.

[0013] However, as the arrow head showed all over this drawing, it reflects by the side edge of the upper frame SHD, or it reflects between a liquid crystal panel and the inside of the upper frame SHD, and outgoing radiation of a part of light from the back light which carried out outgoing radiation from the edge of a polarizing plate POL is carried out in the direction of the screen. This makes the periphery of viewport bright and the above-mentioned **** phenomenon happens.

[0014] This **** phenomenon becomes the cause of reducing the contrast of a display image and degrading visibility.

[0015] The purpose of this invention cancels the trouble of the above-mentioned conventional technique, and is to offer the liquid crystal display which has high contrast and good visibility.

[0016]

[Means for Solving the Problem] The liquid crystal panel with which this invention comes to pinch a liquid crystal layer between the transparence substrates of the pair which has an electrode for pixel selection at least in one side by which opposite arrangement was carried out in order to attain the above-mentioned purpose, The upper polarizing plate arranged on both sides of said liquid crystal panel and a bottom polarizing plate, and the driving means for impressing the electrical potential difference according to a status signal to said electrode, In the liquid crystal display which it comes to fix by the bottom frame the installed back light is connected [bottom / tooth back / of said liquid crystal panel] with the upper frame which has a display window, and this upper frame While having an extinction processing side into the part of the display window of said upper frame which faces said liquid crystal panel at least, it has the description at the point which said upper polarizing plate was made to extend to the lower layer of said upper frame, and has arranged it.

[0017] The protection-from-light effectiveness improves further by the outgoing radiation light of a back light leaking from between viewport and upper frames, or reflecting in a metal frame, leaking in the display direction, and coming out being prevented, and extending and installing the edge of an upper polarizing plate to the inferior surface of tongue of an upper frame by the above-mentioned configuration.

[0018] It applies or bakes and the extinction processing performed to the part of the display window of the above-mentioned upper frame which faces said liquid crystal panel at least can acquire a surface of metal with gloss, such as black metal coats, such as chromium, stainless steel, and iron or aluminum, for a black coating. Moreover, the ingredient of the upper frame itself may be formed with the black metal plate of chromium and others.

[0019] Furthermore, a protection-from-light frame is formed by black resin, this may be embedded inside the window part of an upper frame, or a black plastic tape etc. may be stuck.

[0020] At this time, it was checked experimentally that the fall of contrast and degradation of visibility according the reflection factor of the front face which faces the liquid crystal panel of an upper frame to 5% or less, then leakage light can be prevented.

[0021] In addition, this invention controls transparency / un-penetrating by change of the electrical potential difference impressed to a liquid crystal layer, and changes from the black display from a white display, or a black display to a white display. [of the illumination light from a back light] This invention is applicable also to the liquid crystal display with which angle of torsion used the Twisted Nematic (TN mold) liquid crystal around 90 degrees, and angle of torsion used the super-twisted-nematic (STN mold) liquid crystal of 200 to 260 degrees or the liquid crystal display of the horizontal electric-field method which operates by the electric field of a direction parallel to perpendicular orientation type (vertical electric-field method) TFT and a substrate side, and the liquid crystal display of other form.

[0022]

[Embodiment of the Invention] Hereafter, with reference to an example, it explains to a detail about the gestalt of operation of this invention.

[0023] Drawing 1 is an important section cross section explaining the 1st example of the liquid crystal display by this invention, and SUB1 shows the case where a bottom substrate and SUB2 constitute an upper substrate, and POL

constitutes displays, such as an upper polarizing plate and a computer by which in a light guide plate and LP a reflector and SHD mount a light source lamp and LS, and an extinction processing side and CASE mount [GLB] an upper frame and BKD.

[0024] When this liquid crystal display is a TN mold and perpendicular orientation type vertical electric-field method, product deltan-d of refractive-index anisotropy deltan of the liquid crystal layer 2 and the cel gap (gap between vertical substrates) d is desirable in order for the range of 0.2 to 0.6 micrometers to reconcile a contrast ratio and brightness, and, in the case of a STN mold, the range of 0.5 to 1.2 micrometers has the range desirable in a horizontal electric-field method of 0.2 to 0.5 micrometers.

[0025] Here, two glass substrates with which thickness ground the front face by 0.7mm, and formed the transparent electrode of ITO (indium tin oxide) by the spatter as vertical substrates 3b and 3a are used. Among these vertical substrates 3b and 3a, the dielectric constant anisotropy deltanepsilon is [the value] 4.5 in forward, rate of birefringence deltan sandwiched the nematic liquid crystal constituent of 0.19 (589nm, 20-degreeC), the cel gap was written as 6 micrometers, and deltan-d could be 1.41 micrometers.

[0026] And the polyimide system orientation control film applied to the substrate front face was applied with the spinner, it calcinated for 30 minutes by 250-degreeC, rubbing processing was performed, and the pre tilt angle of 3.5 degrees was formed. In addition, this pre tilt angle was measured with the rotating crystal method. The direction of rubbing of a vertical substrate was set up so that angle of torsion (twist angle) of a liquid crystal molecule might become 240 degrees, in order to perform a time-sharing drive. Here, a twist angle is prescribed by the class and amount of an optically active substance which are added by the direction of rubbing, and the nematic liquid crystal.

[0027] Since angle of torsion serves as orientation on which the lighting conditions near the threshold are scattered in light, maximum is restricted, 260 degrees is an upper limit, and a minimum is restricted by contrast and 200 degrees is a limitation.

[0028] In this example, since the number of scanning lines aimed at obtaining at least 200 or more liquid crystal displays in which monochrome display is possible by sufficient contrast, angle of torsion was made into 240 degrees. Moreover, it has arranged each the deltan-d=0.4micrometer phase contrast film which consists of a polycarbonate between bottom substrate 3a, upper substrate 3b, and each polarizing plates 1a and 1b one sheet (not shown).

[0029] In this example, the window part inside and the ulnar margin of the part SHD which faces the liquid crystal panel of the upper frame SHD which fixes a liquid crystal panel PNL, i.e., the upper frame concerned, were equipped with the extinction processing side BKD. The upper polarizing plate POL stuck on the upper substrate SUB 2 of a liquid crystal panel PNL with this was extended to the upper frame SHD bottom.

[0030] Drawing 2 is a partial diagrammatic view explaining the configuration of the upper frame of the 1st example of the liquid crystal display by this invention.

[0031] This drawing (a) is a partial perspective view showing the rear face of the upper frame SHD, all over drawing, forms the chromium metal membrane which attached double hatching, and makes this the extinction processing side BKD at the rear face and ulnar margin of the inner circumference edge surrounding a window part WD.

[0032] This drawing (b) is a fragmentary sectional view showing the cross section cut by the B-B line of (a) with the same posture as drawing 1 . Although the extinction processing side BKD was given only to the rear face and ulnar margin surrounding a window part WD of an inner circumference edge in this example, the same extinction processing side BKD also as the top-face edge shown by the illustration arrow head C may be formed, and the still more nearly same extinction processing side BKD as remaining a part or the remaining whole of a part of the upper frame SHD concerned may be formed.

[0033] By having considered as the configuration of this example, the optical leakage from between the viewport of the liquid crystal panel at the time of narrow-picture-frame-izing and upper frames is controlled, contrast is high and the liquid crystal display excellent in visibility can be obtained.

[0034] Drawing 3 is the assembly final drawing of the liquid crystal display by this invention, in (A), a right-hand side side elevation and (D) show a top side face, and, as for the top view by the side of the screen, and (B), (E) shows a bottom side elevation, as for a left side view and (C).

[0035] As for viewport and MCA, in this drawing, an upper frame and AR of SHD are [a bottom frame (bottom case) and HLD 1-4] an installation hole and opening to which in LCT a lamp cable and CT1 expose an interface connector to, and, as for WD, a connection connector and LPC 1 and 2 expose a viewing area. Moreover, with the upper polarizing plate, POL covers the top face of a liquid crystal panel PNL, and is stuck.

[0036] This liquid crystal display is incorporated using two kinds of receipt and attachment components, the upper frame SHD and the bottom frame ML, and is mounted in the display of information processors, such as a notebook computer and a monitor, in the installation holes 1-HLD 4.

[0037] The inverter for back lights is built into the crevice among the installation holes HLD1 and HLD3, and power is supplied to the cold cathode fluorescent lamp (light source lamp) which constitutes a back light assembly from a connection connector LCT and lamp cables LPC1 and LPC2. In addition, in this example, fluorescence tubing is incorporated the flesh-side vertical side of the liquid crystal display component PNL.
[0038] The signal and the required power source from a main frame computer (host) are supplied through the interface connector CT 1 located in a rear face.
[0039] The liquid crystal display of illustration has a large outer-diameter dimension, and although Viewport AR became large, its so-called frame field which does not contribute to a display is small. Furthermore, weight is also lightweight-ized, and a legible big screen display is obtained, without losing the portability of a portable mold information processor.
[0040] Drawing 4 is an expansion perspective view explaining the whole liquid crystal display configuration by this invention. This drawing explains the concrete structure of the liquid crystal display (module: call MDL) which unified a liquid crystal display panel, the circuit board, a back light, and other configuration members.
[0041] The upper frame which SHD becomes from a metal plate (it is also called a shielding case and a metal frame), WD -- a display window and INSs 1-3 -- an insulation sheet and PCBs 1-3 -- the circuit board (PCB1 -- drain side-circuit substrate: -- the circuit board for a video-signal line drive --) PCB2 a gate side-circuit substrate and PCB3 An interface-circuitry substrate, The joiner to which JN 1-3 connects one to circuit board PCB3 comrades electrically, A tape career package and PNL TCP1 and TCP2 A liquid crystal display panel, POL a rubber cushion and ILS for an upper polarizing plate and GC A protection-from-light spacer, In PRS, a prism sheet and SPS a light guide plate and RFS for a diffusion sheet and GLB A reflective sheet, Opening of MCA and BAT are pressure sensitive adhesive doudle coated tapes, the bottom frame (bottom case: mold frame) and MO in which MCA was formed by unification shaping accumulate a diffusion plate member due to arrangement illustration, and the liquid crystal display module MDL is assembled. In addition, illustration of a light source lamp part was omitted.
[0042] (The liquid crystal display module MDL) has two sorts of receipt and attachment components, the bottom frame CA and the upper frame SHD, and carries out receipt immobilization of insulation sheet INSs 1-3, the circuit boards 1-PCBs 3, and the liquid crystal display panel PNL, and this liquid crystal display makes the bottom frame MCA which contained the back light which consists of light guide plates GLB etc. come to coalesce in the upper frame SHD.
[0043] The integrated circuit chip for driving each pixel of the liquid crystal display panel PNL is carried in the circuit board PCB 1 for a video-signal line drive, and the timing converter (TCON) which processes into the interface-circuitry substrate PCB 3 the integrated circuit chip which accepts control signals, such as acceptance of the video signal from an external host and a timing signal, and timing, and generates a clock signal is carried.
[0044] The clock signal generated by the above-mentioned timing converter is supplied to the integrated circuit chip carried in the circuit board PCB 1 for a video-signal line drive.
[0045] The interface-circuitry substrate PCB 3 and the circuit board PCB 1 for a video-signal line drive are multilayer-interconnection substrates, and above-mentioned clock signal Rhine CLL is formed as inner layer wiring of the interface-circuitry substrate PCB 3 and the circuit board PCB 1 for a video-signal line drive.
[0046] In addition, the drain side-circuit substrate PCB 1 for driving TFT, the gate side-circuit substrate PCB 2, and the interface-circuitry substrate PCB 3 are connected to the liquid crystal display panel PNL with the tape career packages TCP1 and TCP2, and it connects by the joiner 1, 2, and JN 3 between each circuit board.
[0047] Drawing 5 is the external view of the personal computer explaining an example of an information processor which mounted the liquid crystal display shown in drawing 4 , the same sign as said each drawing corresponds to the same part, and the inverter power source for a fluorescence tubing drive in IV and CPU are host side central processing units.
[0048] According to the personal computer shown in this drawing, the angle of visibility is large and image display with good visibility is obtained by uniform contrast.
[0049] In addition, this invention is not applied only within the active matrix liquid crystal display of the above-mentioned horizontal electric-field method, and can be similarly applied as the liquid crystal orientation control ability unnecessary approach and equipment of the orientation film in the liquid crystal display of a vertical electric-field method or a passive matrix.
[0050]
[Effect of the Invention] According to this invention, as explained above, the optical leakage from between the viewport of the liquid crystal panel at the time of narrow-picture-frame-izing and upper frames is controlled, contrast is high and the liquid crystal display excellent in visibility can be obtained.

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PRIOR ART

[Description of the Prior Art] In the liquid crystal display in which the high definition and color display for a notebook computer or computer screens are possible, it has the light source (the so-called back light) which illuminates a liquid crystal panel from a tooth back. The side edge method which has arranged the linear lamp on the side face of the transparence plate fabricated with the acrylic resin called a light guide plate in the back light, and the direct female mold method which has arranged the lamp directly under [tooth-back] a liquid crystal panel are learned.
[0003] Especially in the notebook computer as which thin shape-ization is required, in order to adopt the side edge method and to shorten depth also with the liquid crystal display for monitors, a side edge method is used.
[0004] This kind of liquid crystal display constitutes fundamentally the so-called liquid crystal panel with which at least one side pinched the liquid crystal layer between two substrates which consist of transparent glass etc. It is classified into the format of impressing an electrical potential difference to the various electrodes for pixel formation formed in the substrate of the above-mentioned liquid crystal panel alternatively, and performing lighting and putting out lights of a predetermined pixel, and the format of performing lighting and putting out lights of a predetermined pixel by forming the active component the various above-mentioned electrodes and for pixel selection, and choosing this active component.
[0005] The liquid crystal display of the latter format is called a active-matrix mold, and its liquid crystal display is in use from the contrast engine performance, the high-speed display engine performance, etc. The so-called vertical electric-field method which impresses the electric field for changing the direction of orientation of a liquid crystal layer between the electrode formed in one substrate and the electrode formed in the substrate of another side was used for the conventional active matrix liquid crystal display.
[0006] Moreover, the so-called liquid crystal display of the horizontal electric-field method (it is also called an IPS method) which makes the direction of the electric field impressed to a liquid crystal layer a direction almost parallel to a substrate side was realized in recent years. What uses a ctenidium electrode for one side of two substrates, and obtained the very large angle of visibility as a liquid crystal display of this horizontal electric-field method is known (JP,63-21907,B, U.S. Pat. No. 4345249 specification).

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EFFECT OF THE INVENTION

[Effect of the Invention] According to this invention, as explained above, the optical leakage from between the viewport of the liquid crystal panel at the time of narrow-picture-frame-izing and upper frames is controlled, contrast is high and the liquid crystal display excellent in visibility can be obtained.

[Translation done.]

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Size has enlarged the liquid crystal display for the computer screens of not only a notebook computer but various information processors every year, and the demand of narrow-picture-frame-izing is becoming strong. Since spacing of the equipment edge and viewport becomes narrow when a liquid crystal display is narrow-picture-frame-ized, it is difficult to fully shade the optical leakage by viewport from a back light.
[0008] Drawing 6 is an outline sectional view explaining the example of important section structure of the conventional liquid crystal display. The liquid crystal panel PNL which pinched liquid crystal between two substrates SUB1 (bottom substrate) and SUB2 (upper substrate), and carried out the laminating of the polarizing plate POL (only the upper polarizing plate was shown by a diagram) to the vertical side, The back light BL installed in the tooth back of this liquid crystal panel is fixed with the upper frame SHD and a bottom frame (not shown), and a liquid crystal module is constituted.
[0009] This liquid crystal module is contained in the case CASE of the notebook computer to mount, a computer screen, etc., and let it be displays, such as the computer screen concerned.
[0010] however -- this kind of liquid crystal display -- that upper frame -- electromagnetism -- since it is what is formed with a metal plate in order to secure that for controlling radiation, and a mechanical strength, the rate of a light reflex in that front face is high, and the **** phenomenon in which the leakage light from the back light in the rim of viewport reflects in the inner circumference field of the display window of an upper frame, and the perimeter of viewport becomes bright happens. Drawing 7 R> 7 is the enlarged drawing of A part of drawing 6 explaining generating of the optical leakage in the conventional liquid crystal display.
[0011] A liquid crystal panel PNL serves as the upper substrate SUB 1 from under [2] SUB, and the upper polarizing plate POL is stuck on the top face of an upper substrate. Besides, a polarizing plate POL is in the location which withdrew into the method of inside from the edge of the upper substrate SUB 2. Moreover, width of face of the upper frame SHD is narrowed for narrow-picture-frame-izing.
[0012] And the protection-from-light spacer ILS is put between the periphery between the back lights BL and liquid crystal panels PNL for preventing the optical leakage from the periphery of a liquid crystal panel PNL.
[0013] However, as the arrow head showed all over this drawing, it reflects by the side edge of the upper frame SHD, or it reflects between a liquid crystal panel and the inside of the upper frame SHD, and outgoing radiation of a part of light from the back light which carried out outgoing radiation from the edge of a polarizing plate POL is carried out in the direction of the screen. This makes the periphery of viewport bright and the above-mentioned **** phenomenon happens.

[0014] This **** phenomenon becomes the cause of reducing the contrast of a display image and degrading visibility.
[0015] The purpose of this invention cancels the trouble of the above-mentioned conventional technique, and is to offer the liquid crystal display which has high contrast and good visibility.

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MEANS

[Means for Solving the Problem] The liquid crystal panel with which this invention comes to pinch a liquid crystal layer between the transparence substrates of the pair which has an electrode for pixel selection at least in one side by which opposite arrangement was carried out in order to attain the above-mentioned purpose, The upper polarizing plate arranged on both sides of said liquid crystal panel and a bottom polarizing plate, and the driving means for impressing the electrical potential difference according to a status signal to said electrode, In the liquid crystal display which it comes to fix by the bottom frame the installed back light is connected [bottom / tooth back / of said liquid crystal panel] with the upper frame which has a display window, and this upper frame While having an extinction processing side into the part of the display window of said upper frame which faces said liquid crystal panel at least, it has the description at the point which said upper polarizing plate was made to extend to the lower layer of said upper frame, and has arranged it.
[0017] The protection-from-light effectiveness improves further by the outgoing radiation light of a back light leaking from between viewport and upper frames, or reflecting in a metal frame, leaking in the display direction, and coming out being prevented, and extending and installing the edge of an upper polarizing plate to the inferior surface of tongue of an upper frame by the above-mentioned configuration.
[0018] It applies or bakes and the extinction processing performed to the part of the display window of the above-mentioned upper frame which faces said liquid crystal panel at least can acquire a surface of metal with gloss, such as black metal coats, such as chromium, stainless steel, and iron or aluminum, for a black coating. Moreover, the ingredient of the upper frame itself may be formed with the black metal plate of chromium and others.
[0019] Furthermore, a protection-from-light frame is formed by black resin, this may be embedded inside the window part of an upper frame, or a black plastic tape etc. may be stuck.
[0020] At this time, it was checked experimentally that the fall of contrast and degradation of visibility according the reflection factor of the front face which faces the liquid crystal panel of an upper frame to 5% or less, then leakage light can be prevented.
[0021] In addition, this invention controls transparency / un-penetrating by change of the electrical potential difference impressed to a liquid crystal layer, and changes from the black display from a white display, or a black display to a white display. [of the illumination light from a back light] This invention is applicable also to the liquid crystal display with which angle of torsion used the Twisted Nematic (TN mold) liquid crystal around 90 degrees, and angle of torsion used the super-twisted-nematic (STN mold) liquid crystal of 200 to 260 degrees or the liquid crystal display of the horizontal electric-field method which operates by the electric field of a direction parallel to perpendicular orientation type (vertical electric-field method) TFT and a substrate side, and the liquid crystal display of other form.
[0022]
[Embodiment of the Invention] Hereafter, with reference to an example, it explains to a detail about the gestalt of operation of this invention.
[0023] Drawing 1 is an important section cross section explaining the 1st example of the liquid crystal display by this invention, and SUB1 shows the case where a bottom substrate and SUB2 constitute an upper substrate, and POL constitutes displays, such as an upper polarizing plate and a computer by which in a light guide plate and LP a reflector and SHD mount a light source lamp and LS, and an extinction processing side and CASE mount [GLB] an upper frame and BKD.
[0024] When this liquid crystal display is a TN mold and perpendicular orientation type vertical electric-field method, product deltan-d of refractive-index anisotropy deltan of the liquid crystal layer 2 and the cel gap (gap between vertical substrates) d is desirable in order for the range of 0.2 to 0.6 micrometers to reconcile a contrast ratio and brightness, and, in the case of a STN mold, the range of 0.5 to 1.2 micrometers has the range desirable in a horizontal electric-field method of 0.2 to 0.5 micrometers.

[0025] Here, two glass substrates with which thickness ground the front face by 0.7mm, and formed the transparent electrode of ITO (indium tin oxide) by the spatter as vertical substrates 3b and 3a are used. Among these vertical substrates 3b and 3a, the dielectric constant anisotropy deltanepsilon is [the value] 4.5 in forward, rate of birefringence deltan sandwiched the nematic liquid crystal constituent of 0.19 (589nm, 20-degreeC), the cel gap was written as 6 micrometers, and deltan-d could be 1.41 micrometers.

[0026] And the polyimide system orientation control film applied to the substrate front face was applied with the spinner, it calcinated for 30 minutes by 250-degreeC, rubbing processing was performed, and the pre tilt angle of 3.5 degrees was formed. In addition, this pre tilt angle was measured with the rotating crystal method. The direction of rubbing of a vertical substrate was set up so that angle of torsion (twist angle) of a liquid crystal molecule might become 240 degrees, in order to perform a time-sharing drive. Here, a twist angle is prescribed by the class and amount of an optically active substance which are added by the direction of rubbing, and the nematic liquid crystal.

[0027] Since angle of torsion serves as orientation on which the lighting conditions near the threshold are scattered in light, maximum is restricted, 260 degrees is an upper limit, and a minimum is restricted by contrast and 200 degrees is a limitation.

[0028] In this example, since the number of scanning lines aimed at obtaining at least 200 or more liquid crystal displays in which monochrome display is possible by sufficient contrast, angle of torsion was made into 240 degrees. Moreover, it has arranged each the deltan-d=0.4micrometer phase contrast film which consists of a polycarbonate between bottom substrate 3a, upper substrate 3b, and each polarizing plates 1a and 1b one sheet (not shown).

[0029] In this example, the window part inside and the ulnar margin of the part SHD which faces the liquid crystal panel of the upper frame SHD which fixes a liquid crystal panel PNL, i.e., the upper frame concerned, were equipped with the extinction processing side BKD. The upper polarizing plate POL stuck on the upper substrate SUB 2 of a liquid crystal panel PNL with this was extended to the upper frame SHD bottom.

[0030] Drawing 2 is a partial diagrammatic view explaining the configuration of the upper frame of the 1st example of the liquid crystal display by this invention.

[0031] This drawing (a) is a partial perspective view showing the rear face of the upper frame SHD, all over drawing, forms the chromium metal membrane which attached double hatching, and makes this the extinction processing side BKD at the rear face and ulnar margin of the inner circumference edge surrounding a window part WD.

[0032] This drawing (b) is a fragmentary sectional view showing the cross section cut by the B-B line of (a) with the same posture as drawing 1 . Although the extinction processing side BKD was given only to the rear face and ulnar margin surrounding a window part WD of an inner circumference edge in this example, the same extinction processing side BKD also as the top-face edge shown by the illustration arrow head C may be formed, and the still more nearly same extinction processing side BKD as remaining a part or the remaining whole of a part of the upper frame SHD concerned may be formed.

[0033] By having considered as the configuration of this example, the optical leakage from between the viewport of the liquid crystal panel at the time of narrow-picture-frame-izing and upper frames is controlled, contrast is high and the liquid crystal display excellent in visibility can be obtained.

[0034] Drawing 3 is the assembly final drawing of the liquid crystal display by this invention, in (A), a right-hand side side elevation and (D) show a top side face, and, as for the top view by the side of the screen, and (B), (E) shows a bottom side elevation, as for a left side view and (C).

[0035] As for viewport and MCA, in this drawing, an upper frame and AR of SHD are [a bottom frame (bottom case) and HLD 1-4] an installation hole and opening to which in LCT a lamp cable and CT1 expose an interface connector to, and, as for WD, a connection connector and LPC 1 and 2 expose a viewing area. Moreover, with the upper polarizing plate, POL covers the top face of a liquid crystal panel PNL, and is stuck.

[0036] This liquid crystal display is incorporated using two kinds of receipt and attachment components, the upper frame SHD and the bottom frame ML, and is mounted in the display of information processors, such as a notebook computer and a monitor, in the installation holes 1-HLD 4.

[0037] The inverter for back lights is built into the crevice among the installation holes HLD1 and HLD3, and power is supplied to the cold cathode fluorescent lamp (light source lamp) which constitutes a back light assembly from a connection connector LCT and lamp cables LPC1 and LPC2. In addition, in this example, fluorescence tubing is incorporated the flesh-side vertical side of the liquid crystal display component PNL.

[0038] The signal and the required power source from a main frame computer (host) are supplied through the interface connector CT 1 located in a rear face.

[0039] The liquid crystal display of illustration has a large outer-diameter dimension, and although Viewport AR became large, its so-called frame field which does not contribute to a display is small. Furthermore, weight is also lightweight-

ized, and a legible big screen display is obtained, without losing the portability of a portable mold information processor.
[0040] Drawing 4 is an expansion perspective view explaining the whole liquid crystal display configuration by this invention. This drawing explains the concrete structure of the liquid crystal display (module: call MDL) which unified a liquid crystal display panel, the circuit board, a back light, and other configuration members.
[0041] The upper frame which SHD becomes from a metal plate (it is also called a shielding case and a metal frame), WD -- a display window and INSs 1-3 -- an insulation sheet and PCBs 1-3 -- the circuit board (PCB1 -- drain side-circuit substrate: -- the circuit board for a video-signal line drive --) PCB2 a gate side-circuit substrate and PCB3 An interface-circuitry substrate, The joiner to which JN 1-3 connects one to circuit board PCB3 comrades electrically, A tape career package and PNL TCP1 and TCP2 A liquid crystal display panel, POL a rubber cushion and ILS for an upper polarizing plate and GC A protection-from-light spacer, In PRS, a prism sheet and SPS a light guide plate and RFS for a diffusion sheet and GLB A reflective sheet, Opening of MCA and BAT are pressure sensitive adhesive doudle coated tapes, the bottom frame (bottom case: mold frame) and MO in which MCA was formed by unification shaping accumulate a diffusion plate member due to arrangement illustration, and the liquid crystal display module MDL is assembled. In addition, illustration of a light source lamp part was omitted.
[0042] (The liquid crystal display module MDL) has two sorts of receipt and attachment components, the bottom frame CA and the upper frame SHD, and carries out receipt immobilization of insulation sheet INSs 1-3, the circuit boards 1-PCBs 3, and the liquid crystal display panel PNL, and this liquid crystal display makes the bottom frame MCA which contained the back light which consists of light guide plates GLB etc. come to coalesce in the upper frame SHD.
[0043] The integrated circuit chip for driving each pixel of the liquid crystal display panel PNL is carried in the circuit board PCB 1 for a video-signal line drive, and the timing converter (TCON) which processes into the interface-circuitry substrate PCB 3 the integrated circuit chip which accepts control signals, such as acceptance of the video signal from an external host and a timing signal, and timing, and generates a clock signal is carried.
[0044] The clock signal generated by the above-mentioned timing converter is supplied to the integrated circuit chip carried in the circuit board PCB 1 for a video-signal line drive.
[0045] The interface-circuitry substrate PCB 3 and the circuit board PCB 1 for a video-signal line drive are multilayer-interconnection substrates, and above-mentioned clock signal Rhine CLL is formed as inner layer wiring of the interface-circuitry substrate PCB 3 and the circuit board PCB 1 for a video-signal line drive.
[0046] In addition, the drain side-circuit substrate PCB 1 for driving TFT, the gate side-circuit substrate PCB 2, and the interface-circuitry substrate PCB 3 are connected to the liquid crystal display panel PNL with the tape career packages TCP1 and TCP2, and it connects by the joiner 1, 2, and JN 3 between each circuit board.
[0047] Drawing 5 is the external view of the personal computer explaining an example of an information processor which mounted the liquid crystal display shown in drawing 4 , the same sign as said each drawing corresponds to the same part, and the inverter power source for a fluorescence tubing drive in IV and CPU are host side central processing units.
[0048] According to the personal computer shown in this drawing, the angle of visibility is large and image display with good visibility is obtained by uniform contrast.
[0049] In addition, this invention is not applied only within the active matrix liquid crystal display of the above-mentioned horizontal electric-field method, and can be similarly applied as the liquid crystal orientation control ability unnecessary approach and equipment of the orientation film in the liquid crystal display of a vertical electric-field method or a passive matrix.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is an important section cross section explaining the 1st example of the liquid crystal display by this invention.
[Drawing 2] It is a partial diagrammatic view explaining the configuration of the upper frame of the 1st example of the liquid crystal display by this invention.
[Drawing 3] It is the assembly final drawing of the liquid crystal display by this invention.
[Drawing 4] It is an expansion perspective view explaining the whole liquid crystal display configuration by this invention.
[Drawing 5] It is the external view of the personal computer explaining an example of an information processor which mounted the liquid crystal display shown in drawing 4 .
[Drawing 6] It is an outline sectional view explaining the example of important section structure of the conventional liquid crystal display.
[Drawing 7] It is the enlarged drawing of A part of drawing 6 explaining generating of the optical leakage in the conventional liquid crystal display.
[Description of Notations]
SUB1 Bottom substrate
SUB2 Top substrate
POL Top polarizing plate
GLB Light guide plate
LP Light source lamp
LS Reflector
SHD Top frame
BKD Extinction processing side
CASE Case which constitutes displays, such as a computer to mount.

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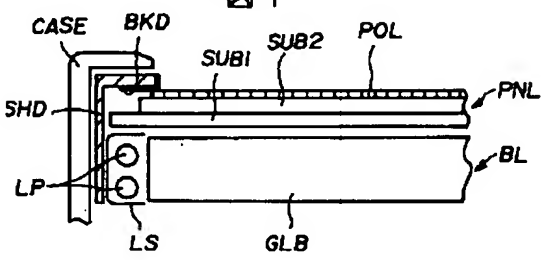
DRAWINGS

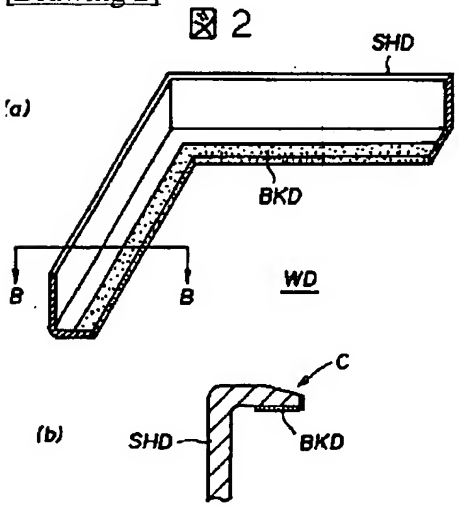
[Drawing 1]

図 1



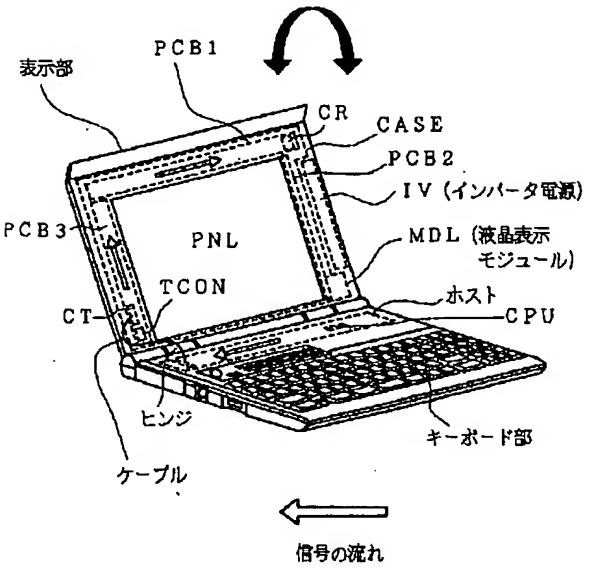
[Drawing 2]

図 2



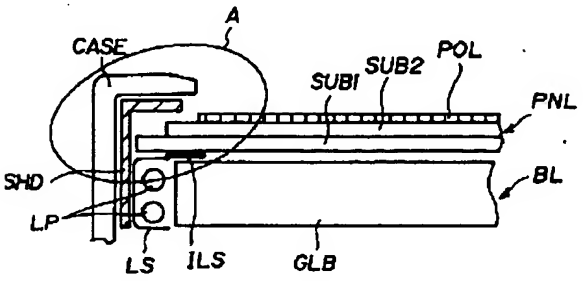
[Drawing 5]

図5



[Drawing 6]

図6



[Drawing 3]

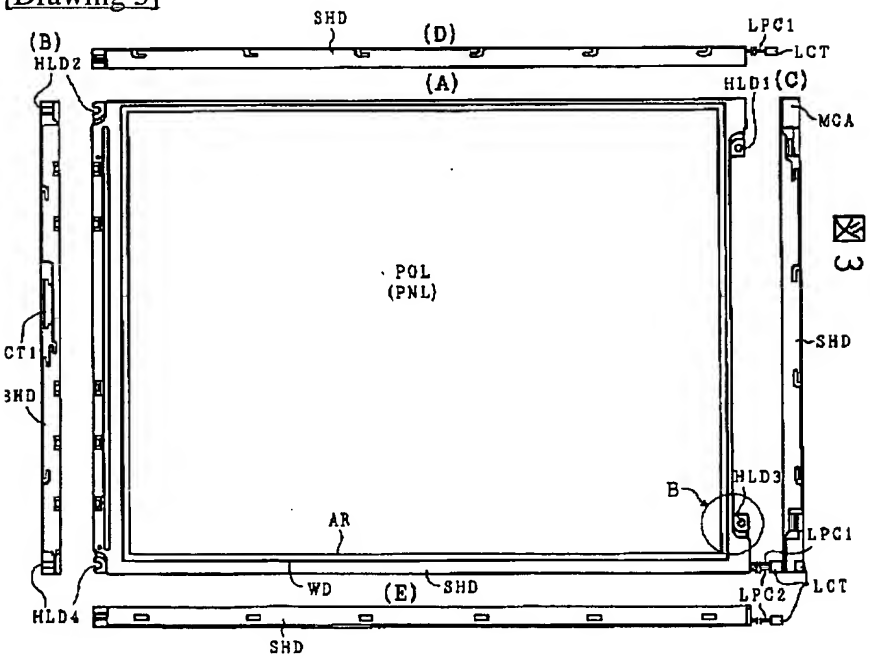
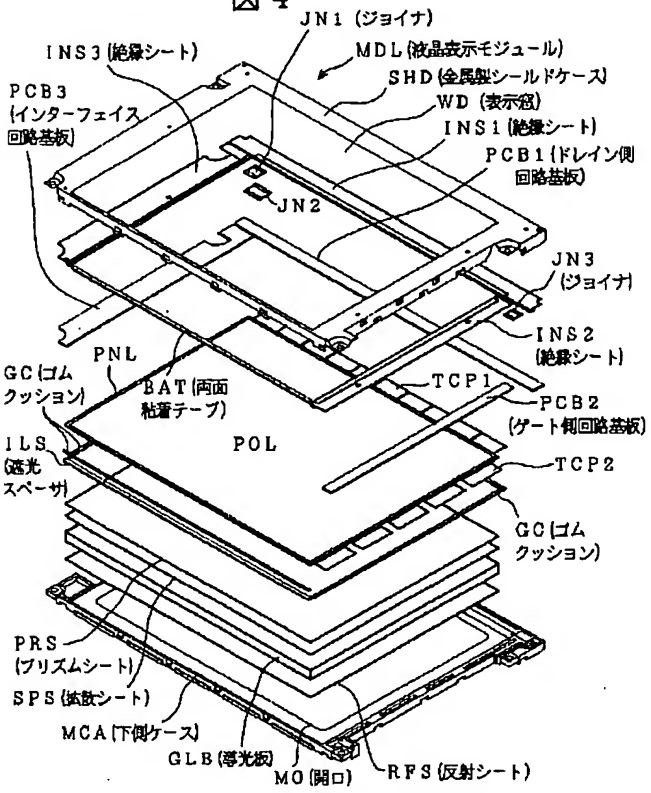


図3

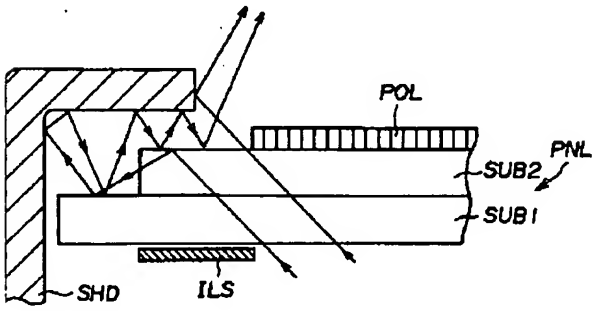
[Drawing 4]

図 4



[Drawing 7]

図 7



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